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ABSTRACT

The steps taken in compiling lists of technical terms for use in vocabulary instruction in the six subject areas of communication skills, science, music, social science, mathematics, and art are specified in this paper. The steps outlined included selecting words from both teacher and student textbooks at the kindergarten through grade six levels; limiting the number of terms to those at the average grade level for which they were found; grouping the words for each subject area, first into major categories and then into subcategories; and adding terms when needed to complete a conceptually related set. Appendixes contain the lists for each subject area and summaries of the frequencies of terms in each area. (FL)

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PRELIMINARY SPECIFICATIONS OF CONTENT FOR INSTRUCTION IN SUBJECT-AREA VOCABULARY

Bruce Cronnell, Mary Rhode, and Ann Humes

ABSTRACT

Content is specified for vocabulary instruction in six subject areas: communication skills, social science, science, math, music, and art.

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PRELIMINARY SPECIFICATIONS OF CONTENT FOR INSTRUCTION IN SUBJECT-AREA VOCABULARY*

Bruce Cronnell, Mary Rhode, and Ann Humes

It is axiomatic that students cannot comprehend discourse (oral or written) in a subject area without being able to comprehend the technical terminology used. However, Humes (1976b) reviewed studies which found that students' knowledge of technical vocabulary is weak and thus is a hindrance to understanding instruction in the subject areas. She concluded that "The literature confirms the significance of subject-area vocabulary as a prerequisite to further learning in the various disciplines and the importance of including explicit instruction on technical terminology in a comprehensive program for vocabulary development" (p. 30).

Further analysis (Humes, 1976a) suggested that subject-area vocabulary was one of five major topics under which vocabulary instruction should be undertaken for grades 4-8. Six subject areas were listed in which vocabulary instruction is needed: communication skills, social science, science, math, music, and art. However, vocabulary instruction was differentiated from instruction in the subject areas themselves; as Humes (1976a, p. 14) notes, "vocabulary instruction for math terms does not teach students how to estimate; rather it teaches the term estimate as a vocabulary concept."

*This is one of five papers documenting the specifications for vocabulary development instruction. The papers on vocabulary from context, alternative language, and word analysis and synthesis specify the requirements for a skills-based vocabulary program. The present paper and the paper on synonyms specify the requirements for supplementary instruction.

This paper describes the steps undertaken to specify the item content for instruction in subject-area vocabulary. Appendices list the terms designated for instruction according to these preliminary specifications. As noted later in the paper, these lists are subject to further modification as additional work is undertaken in preparing the terms for instruction.

The technical lexicons compiled by Rhode (1974) served as the bases for the present specifications. These lexicons--lists of technical words compiled from K-6 textbooks--provide a comprehensive summary of the technical terminology used in elementary school instruction. Terms were compiled from both student and teacher texts, and are designated for the average grade level at which they were found. (Rhode specified separate technical lexicons for composition, grammar, literature, reading, and spelling; these are combined here as "communication skills.")

Since instruction was desired for grades 4-8, terms with an average student grade level of 3, 4, 5, or 6 were compiled. Analysis indicated that teacher terms (i.e., those terms used only in teacher materials) were generally used in student texts at two grade levels later. Thus teacher terms designated as grades 5 and 6 were compiled and listed as grades 7 and 8, respectively. Duplicate listings of terms in the five communication skills areas were deleted, retaining the lowest grade level designation.

The first step of compiling terms resulted in several thousand unique terms. Such a large number of terms would be unmanageable for

instruction, so the following criteria were devised for limiting the number included. (The examples used are from science.)

1. Delete terms that are in general use with approximately the same meaning as in the subject area; e.g., scissors.
2. Delete terms that, while used in a subject area, are more basic to another subject area; e.g., seashore (essentially a social science term).
3. Delete terms that are also found in the communication skills lexicon (Rhode and Cronnell, 1977) at or below the grade level for which they are listed as technical terms, provided that they have the same general meaning in normal technical and non-technical usage (even if the technical usage may require more precise or detailed specification); e.g., alligator.
4. Delete affixed forms of kindergarten level words (Rhode and Cronnell, 1977) if the affix does not make a significant semantic change; e.g., thickness.
5. Delete compounds and phrases if the headword meets the criterion in (3) and if the compound or phrase is essentially an expanded form of the headword; e.g., hermit crab.
6. Delete compounds and phrases if the headword is already in the subject-area listing and if the compound or phrase is essentially an expanded form of the headword; e.g., aneroid barometer.
7. Delete terms the use of which is vague or unclear in the subject area; e.g., vacant.

8. Delete proper nouns; e.g., Newton.

9. Delete abbreviations; e.g., C.

More specific deletions were made in certain subject areas. In three subject areas, where the meanings of many of the terms were unknown to the specifier, dictionaries were consulted extensively: math (James, 1976); science (Webster's seventh new collegiate dictionary, 1967); music (Apel, 1969). Terms not listed in these dictionaries were deleted. In science (one of the largest lexicons) the following sets of terms were deleted: Latin names for plants and animals, names of chemical elements and compounds, names of rocks and minerals, names of body parts, and common names for specific animals, insects, birds, fish, and plants. In addition, low-frequency terms were deleted in all subject areas. "Low-frequency" was defined as having fewer than ten grade level listings across reviewers and series (cf., Rhode, 1974).

This initial listing of terms, after deletions, netted lists for the six subject areas ranging from approximately 40 to 150 terms.

Within each subject area, terms were categorized: first into the major categories proposed by Humes (1976a, with some additions and deletions based on further study), and then into smaller subcategories. These were, when necessary, divided into groups to form instructional units of from 2 to 12 terms. This unit organization was based on the conceptual relations among terms. In addition, terms were added when they completed a conceptually related set; they are parenthesized in the appendices.

The terms for use in instruction are listed in Appendices A-F; Appendix G contains summaries of the frequencies of terms in each

subject area. (Terms separated by slashes are counted as a single term in Appendix G.)

The work described in this paper is only the first step in the specification of instruction in subject-area vocabulary. Tryout experience (Cronnell and Humes, 1977) has indicated that subject-area vocabulary is best taught using concept-learning strategies. Humes (1977) has outlined the steps to be undertaken to prepare content for concept-learning instruction. In the process of this work, several changes are possible: (1) terms may be added to complete a set of concepts; (2) terms may be deleted that do not have conceptual relations to other terms in the subject area; (3) terms may be shifted among units as deemed more appropriate for conceptual organization. However, it is expected that such changes will be minimal; thus the present specifications present a close approximation of the organized content to be taught for subject-area vocabulary.

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APPENDIX A

SUBJECT-AREA VOCABULARY: COMMUNICATION SKILLS

General

Unit 1:
- exception
- linguist/linguistic/ linguistics
- synonym
- translate
- vocabulary

Grammar

Unit 1: General
- grammar
- idiom
- regular/irregular

Unit 2: Sentences
- command/imperative
- complex sentence
- declarative
- direct quotation
- exclamatory
- interrogative
- simple sentence

Unit 3: Functions
- complement
- modify/modifier
- object/direct object
- predicate
- subject

Unit 4: Nominals
- common noun
- (noun)
- noun phrase
- number
- personal pronoun
- plural
- possessive
- (pronoun)
- proper noun
- singular

Unit 5: Verbals
- agreement
- auxiliary
- past participle
- past tense
- present tense
- (verb)

Unit 6: Other Parts of Speech
- (adjective)
- (adverb)
- article
- determiner
- negative
- part of speech

Grammar (continued)

Unit 7: Morphology

affix
base/base word
compound/compound word
(prefix)
root/root word
(suffix)

Unit 8: Other Parts of Speech

(comparative)
conjunction
preposition/
  prepositional phrase
superlative

Phonology

Unit 1: Vowels

long vowel
schwa
short vowel
vowel sound

Unit 2: Suprasegmentals

accent/accent mark/
  stress/stress mark
accented/unaccented/
  stressed/unstressed
intonation

Phonics

Unit 1:

blend
homograph
homophone
silent letter

Composition

Unit 1: Punctuation

apostrophe
colon
(comma)
exclamation mark/
  exclamation point
hyphen
parentheses
(period)
punctuate/punctuation
question mark
quotation marks
semicolon
slash mark

Unit 2: Letter forms

capital letter
capitalize/
  capitalization
italics
lower case
small letter
(upper case)

Composition (continued)

Unit 3: Form

composition
heading
indentation
paragraph
title/subtitle

Unit 4: General

abbreviation
contraction
(outline)
proofread

Unit 5: Correspondence

business letter
closing
friendly letter
greeting
inside address
return address
salutation
signature

Writing

Unit 1: Types

(argumentative)/argument
descriptive/description
explanatory/explanation
expository/exposition
expressive
narrative/narration/
narrator

Unit 2: General

compare
context
excerpt
figure or speech
point of view
quotation
simile
summary/summarize

Unit 3: Structure

chronological
climax
conclusion
detail
introduction
solution
topic/subtopic

Unit 4: Parts

(character)
dialogue
incident
setting
situation

Literary Forms

Unit 1: General

fiction
nonfiction
(poetry)

Unit 2: Fiction

fairy tale
fantasy
folk tale
legend
myth
tall tale

Unit 3: Drama

act
drama/dramatize/
  dramatization
scene

Unit 4: Poetry

haiku
jingle
limerick

Unit 5: Nonfiction

autobiography
bibliography
biography

References

Unit 1: General

almanac
atlas
reference book

Unit 2: Dictionary

alphabetical/
  alphabetically/
  alphabetize
entry word
glossary
guide words
key word
pronunciation key

APPENDIX B

SUBJECT-AREA VOCABULARY: SOCIAL SCIENCE

General

Unit 1:
- authority
- social science
- specialization

Geography

Unit 1: General

- cartography/cartographer
- climate
- geography/geographer/ geographical
- human geography
- physical geography
- pollution
- population
- population distribution

Unit 2: Earth

- equator
- latitude
- longitude

Unit 3: Land Areas

- isthmus
- peninsula
- plateau

History

Unit 1:
- chronology
- explorer/exploration
- history/historian
- revolt/revolution

Political Science

Unit 1:
- amendment
- Congress
- democracy
- House of Representatives
- nation
- parliament
- policy
- political science
- (President)
- (Senate)
- Supreme Court

Economics

Unit 1: General

competition
division of labor
economic/economics/
economist
labor force
resource

Unit 2: Money

budget
debt
income
medium of exchange
profit

Unit 3: Distribution

consumer
distribution
market
retail
wholesale

Unit 4: Production

(goods)
producer
product

Sociology/Anthropology

Unit 1: General

anthropology/anthropologist
civilization
culture
environment
industrial
social
sociology/sociologist
technology

Unit 2: Archaeology

archaeology/archaeologist
artifact
extinct

Unit 3: Living Areas

slum
suburb
urban

Unit 4: Peoples

caucasoid
migrant/migrate
mongoloid
negroid
nomad
race

APPENDIX C

SUBJECT-AREA VOCABULARY: SCIENCE

General

Unit 1:
- Celsius
- Fahrenheit
- inference
- theory
- variable

Physics

Unit 1:
- frequency
- gravity/gravitation/ gravitational
- mass
- matter

Unit 2:
- current
- electromagnet
- insulator
- magnetic

Unit 3:
- concave
- convex
- lens
- prism
- spectrum

Unit 4:
- fission
- neutron
- nucleus
- proton

Astronomy

Unit 1:
- galaxy
- meteor
- meteorite
- orbit
- revolve
- rotate
- satellite
- solar system

Chemistry

Unit 1:
- (acid)
- (atom)
- base
- compound
- element
- molecule
- property

Biology

Unit 1:
- adaptation
- class/classify
- ecosystem
- environment
- extinct
- food chain
- habitat
- organism
- vertebrate/invertebrate

Unit 2:
- algae
- amphibian
- bacteria
- enzyme
- larva
- reproduce/reproduction
- seedling
- spore
- stamen

Geology

Unit 1:
- core
- fault
- fossil
- sediment/sedimentary

APPENDIX D

SUBJECT-AREA VOCABULARY: MATHEMATICS

General

Unit 1:
- array
- column
- function
- probability
- row
- rule
- solve/solution

Measurement

Unit 1: Metric System

- gram
- liter
- (meter)
- metric system

Unit 2: Metric prefixes

- centi-
- deca-
- deci-
- hecto-
- kilo-
- milli-

Geometry

Unit 1: General

bisect/bisector
geometry/geometric
length
plane
width

Unit 2: Lines

intersect/intersection
midpoint
parallel
perpendicular
ray

Unit 3: Angles

(acute)
obtuse
right
vertex

Unit 4: Polygons

(area)
base
congruent
line of symmetry
perimeter
polygon
similar
square unit

Unit 5: Quadrilaterals

parallelogram
quadrilateral
(rectangle)
rhombus
trapezoid

Unit 6: Circles

chord
(circle)
circumference
(diameter)
ellipse
radius
segment
simple closed curve
tangent

Unit 7: Triangles

equilateral
hypotenuse
isosceles
right
scalene
(triangle)

Unit 8: Graphs

bar graph
coordinate
graph

Unit 9: Three Dimensional Shapes

cone
cube
cubic/cubic unit
cylinder
face
prism
sphere
surface area
volume

Numbers

Unit 1: General (I)

digit
even
odd
Roman numeral
whole number

Unit 2: Fractions

decimal
denominator
(fraction)
lowest terms
numerator

Unit 3: General (II)

exponent
integer
power

Unit 4: Factors

common factor
common multiple/
least common multiple
composite number
factor
multiple
prime/prime number

Numerical Operations

Unit 1: General

associative
commutative
distributive
equation
inequality

Unit 2: Basic Processes

average
difference
estimate
ratio
round
total

Unit 3: Multiplication and Division

dividend
(divisor)
factor
multiplier
product
quotient
remainder

Sets

Unit 1:

empty
equivalent
group
identity
member

Unit 2:

equal
ordered pair
sequence
subset
union

APPENDIX E

SUBJECT-AREA VOCABULARY: MUSIC

General

Unit 1:
- compose
- pitch
- score
- timbre
- tone

Rhythm

Unit 1:
- beat
- meter
- rhythm
- syncopation

Melody

Unit 1: General
- improvise
- melody

Unit 2: Scale
- chromatic scale
- key
- major
- minor
- pentatonic scale
- scale
- whole tone scale

Harmony

Unit 1:
- chord
- harmony/harmonize
- interval
- octave
- tonal center

Notation

Unit 1: Staff

clef
line
measure
space
staff

Unit 2: Notes

dotted note
(eighth note)
(half note)
note/notation
(quarter note)
sixteenth note
tied note
triplet
whole note

Unit 3: Miscellaneous

da capo al fine/D.C. al fine
fermata
flat
key signature
natural
sharp

Expressive Marks

Unit 1: Dynamic Marks

crescendo
decrescendo
forte
mezzo [combining form]
piano

Unit 2: Tempo Marks

allegro
andante
moderato
tempo

Musical Forms and Styles

Unit 1: General

canon
coda
fanfare
fugue
movement
phrase
round
theme

Unit 2: Vocal

ballad
calypso
chantey
chorus
lullaby
spiritual

Unit 3: Sacred

anthem
carol
chant
descant
hymn

Unit 4: Instrumental

concerto
march
minuet
rondo
suite
symphony
waltz

Unit 5: Miscellaneous

blues
jazz
musical comedy
opera

Musical Performance

Unit 1: General

accompaniment
ballet
concert
conduct/conductor

Unit 2: Groups (I)

band
choir
chorale
chorus
orchestra
symphony

Unit 3: Singers

alto
baritone
bass
soprano
tenor

Unit 4: Groups (II)

duet
quartet
quintet
trio

Instruments

Unit 1: String Instruments

banjo
cello
double bass
fiddle
harp
string
viola
(violin)

Unit 2: Brass Instruments

brass
French horn
trombone
trumpet
tuba

Unit 3: Woodwind Instruments

bassoon
clarinet
English horn
flute
oboe
piccolo
recorder
woodwind

Unit 4: Percussion Instruments

bells
cymbals
kettledrums
percussion
snare drum
timpani
triangle

APPENDIX F

SUBJECT-AREA VOCABULARY: ART

General

Unit 1:
- dimension
- fine art
- masterpiece
- mat
- medium/media
- mount
- reproduction
- symmetry/asymmetry

Unit 2:
- architecture
- collage
- mobile
- mosaic
- stained glass
- stitchery
- textile
- texture

Unit 3:
- landscape
- perspective
- portrait
- silhouette
- still life

Color

Unit 1:
- complementary
- contrasting
- cool
- primary
- secondary
- warm

Painting

Unit 1:
- bristle
- canvas
- tempera
- watercolor

Print Making

Unit 1:
- brayer
- etching
- rubbing
- stencil

Ceramics

Unit 1: ceramic
glaze
kiln

Sculpture

Unit 1: armature
chisel
free form
papier-mâché
sculpture

APPENDIX G

FREQUENCY OF TERMS

Table 1: Subject-Area Vocabulary: Communication Skills

Topic	Unit	Frequency	Total
General	1	5	5
Grammar	1	3	47
	2	7	
	3	5	
	4	10	
	5	6	
	6	6	
	7	6	
	8	4	
Phonology	1	4	7
	2	3	
Phonics	1	4	4
Composition	1	12	35
	2	6	
	3	5	
	4	4	
	5	8	
Writing	1	6	26
	2	8	
	3	7	
	4	5	
Literary Forms	1	3	18
	2	6	
	3	3	
	4	3	
	5	3	
References	1	3	9
	2	6	
Total			151

Table 2: Subject-Area Vocabulary: Social Science

Topic	Unit	Frequency	Total
General	1	3	3
Geography	1	8	14
	2	3	
	3	3	
History	1	4	4
Political Science	1	11	11
Economics	1	5	18
	2	5	
	3	5	
	4	3	
Sociology/Anthropology	1	8	20
	2	3	
	3	3	
	4	6	
Total			70

Table 3: Subject-Area Vocabulary: Science

Topic	Unit	Frequency	Total
General	1	5	5
Physics	1	4	17
	2	4	
	3	5	
	4	4	
Astronomy	1	8	8
Chemistry	1	7	7
Biology	1	9	18
	2	9	
Geology	1	4	4
Total			59

Table 4: Subject-Area Vocabulary: Mathematics

Topic	Unit		Total
General	1	7	7
Measurement	1	4	10
	2	6	
Geometry	1	5	54
	2	5	
	3	4	
	4	8	
	5	5	
	6	9	
	7	6	
	8	3	
	9	9	
Numbers	1	5	19
	2	5	
	3	3	
	4	6	
Numerical Operations	1	5	18
	2	6	
	3	7	
Sets	1	5	10
	2	5	
Total			118

Table 5: Subject-Area Vocabulary: Music

Topic	Unit	Frequency	Total
General	1	5	5
Rhythm	1	4	4
Melody	1	2	9
	2	7	
Harmony	1	5	5
Notation	1	5	20
	2	9	
	3	6	
Expressive Marks	1	5	9
	2	4	
Musical Forms and Styles	1	8	30
	2	6	
	3	5	
	4	7	
	5	4	
Musical Performance	1	4	19
	2	6	
	3	5	
	4	4	
Instruments	1	8	28
	2	5	
	3	8	
	4	7	
Total			129

Table 6: Subject-Area Vocabulary: Art

Topic	Unit	Frequency	Total
General	1	8	21
	2	8	
	3	5	
Color	1	6	6
Painting	1	4	4
Print Making	1	4	4
Ceramics	1	3	3
Sculpture	1	5	5
Total			43